

REMARKS

Claims 1-7, 14, and 17-30 are pending in the application. Claims 8-13, 15 and 16 have been canceled. Claims 1-7, 14, and 18-26 and 28-30 stand rejected. Claims 17 and 27 are objected to.

Applicants hereby amend Claims 1, 14, 17 and 27. New claims 31-36 have been added. No new matter has been added to this application.

Claim Rejections under 35 USC §103

The Office Action rejected Claims 1-2, 6-7, 14, 20-21, 25-26 and 30 under 35 U.S.C. §103(a) as being unpatentable over 3GPP (3rd Generation Partnership Project: Technical Specification Group Services & System Aspects; 3GTS 28.062 V1.0.0 (2000-12); pages 1-23; hereinafter as “TS 28.062”) in view of Lehtimäki (U.S. 6,125,120).

Summary of the Invention

The following summary of the invention is provided as a courtesy to the Examiner in order that he may have a concise statement of the nature of the invention. This summary is not a complete description of the invention nor does it discuss all the unique, novel and patentable features of the present invention as recited in the specification and shown in the figures filed.

The present invention is a system and method for transmitting wideband speech signals over a narrowband communications system. Currently, the maximum data capacity for a Public Switched Telephone Network (PSTN) connection is 64 kbps. Standard pulse code modulated (PCM) signals utilize an eight bit representation. For a narrowband signal, 8,000 samples/second must be obtained for accurate reconstruction of the original signal. Thus, the typical PSTN connection reaches its maximum capacity at 8,000 samples/second. However, for a wideband signal typical of the present day wireless communication systems, 16,000 samples/second is obtained for accurate reconstruction of the original signal. Such a wideband signal is capable of propagating acoustics signals between 50Hz and 7,000 Hz. In the current state of the art, a wide band signal is band limited to the constraints of a narrowband system by frequency cut off at 3400 Hz with the result being an unacceptable waveform for human perception.

In order to overcome these and other problems associated with the 64 kbps constraints of a PSTN connection, a tandem free operation (TFO) mode is implemented in which the wideband signal is transmitted over the PSTN to a wideband terminal through the use of 8-bit PCM symbols using packetized data punctured (i.e. inserted) into the PCM symbols. In this manner, packets containing the wideband speech signal are inserted into the least significant bits (LSB) of the mantissa value portion of the PCM data format. Upon receiving the punctured PCM symbols, the base station vocoder passes the already received packetized data to the target terminal.

The Prior Art

TS 28.062 describes an in-band TFO of Speech Codecs. In this system, communications between GSM and 3G networks are described over communications media at a transmission rate of 64 kbps. The “stealing” of the least significant bits in the signal is briefly mentioned but not discussed in any detail. The term “stealing” is not defined in TS 28.062.

Lehtimäki describes speech coding for a mobile communications system in which subchannels of a PCM link may carry vocoded speech.

Argument

As previously discussed in the response filed July 26, 2007, the prior art of record fails to describe the puncturing of a narrow band digital signal with data packets carrying a wideband speech signal. However, in order to expedite allowance of this application, independent claims 1 and 14 have been amended to further detail the process by which the narrowband digital signal is generated. Specifically, independent claims 1 and 14 have been amended to indicate that packets containing the wideband speech signal are inserted in a pseudo-random manner into the least significant bits (LSB) of the mantissa value portion of the PCM data format. This feature finds support in paragraph [0035] (page 10, lines 7-10) of the specification.

The prior art of record fails to describe or suggest taking data packets containing wideband speech and inserting them into a narrowband signal. The prior art of record simply describes “stealing” the least significant bits of a signal or using subchannels of a PCM signal to carry vocoded speech. No discussion is provided by the prior art to suggest inserting wideband speech into a narrowband signal.

Therefore, independent claims 1 and 14 patentably distinguish over the prior art of record by reciting, as exemplified by claim 1.

“A method for transmitting wideband speech signals over a narrowband communication system, comprising: generating a narrowband digital signal at a base station from a plurality of data packets received from a remote station, wherein the plurality of data packets carry a wideband speech signal; puncturing the narrowband digital signal by inserting the plurality of data packets carrying the wideband speech signal into the narrowband digital signal; transmitting the punctured narrowband digital signal over the narrowband communication system to a second base station; separating the narrowband digital signal from the plurality of data packets at the second base station; and forwarding only the plurality of data packets to a second remote station.” (Emphasis Added)

Dependent claims 2, 6-7, 20-21, 25-26 and 30 further recite patentable subject matter and are allowable by virtue of their dependence from allowable independent claims.

Therefore, withdrawal of the rejection of The Office Action rejected Claims 1-2, 6-7, 14, 20-21, 25-26 and 30 under 35 U.S.C. §103(a) as being unpatentable over TS 28.062 in view of Lehtimäki (U.S. 6,125,120) is respectfully requested.

The Office Action rejected Claims 3-5 and 22-24 under 35 U.S.C. 103(a) as being unpatentable over 3GPP (3rd Generation Partnership Project: Technical Specification Group Services & System Aspects; 3GTS 28.062 V1.0.0 (2000-12); pages 1-23) in view of Lehtimäki, Matti (U.S. 6,125,120) as applied to claims 1-2 and 14 in part 3 rejection above, and further in view of Tseng et al. (U.S. 6,172,974).

Tseng et al. describes a wireless communications network in which prior to TFO deployment the disabling of network echo canceller is done.

The prior art of record, including Tseng et al., fails to disclose the method of puncturing of a narrow band digital signal with data packets carrying a wideband speech signal as detailed in independent claims 1 and 14. Therefore, withdrawal of the rejection of claims 3-5 and 22-24 under 35 U.S.C. 103(a) as being unpatentable TS 28.062 in view of Lehtimäki, and further in view of Tseng et al. is respectfully requested.

The Office Action rejected Claim 18 and 28 under 35 U.S.C. 103(a) as being unpatentable over 3GPP (3rd Generation Partnership Project: Technical Specification Group

Services & System Aspects; 3GTS 28.062 V1.0.0 (2000-12); pages 1-23) in view of Lehtimäki, Matti (U.S. 6,125,120) as applied to claims 1-2 and 14 in part 3 rejection above, and further in view of Miet et al. (U.S. 6,681,202).

Miet et al. describes generating wideband signals (100-7000 Hz) from a telephone band (300-3400 Hz) signal to create a speech signal of 100-3400 Hz.

The prior art of record, including Miet et al., fails to disclose the method of puncturing of a narrow band digital signal with data packets carrying a wideband speech signal as detailed in independent claims 1 and 14. Therefore, withdrawal of the rejection of claim 18 and 28 under 35 U.S.C. 103(a) as being unpatentable over TS 28.062 in view of Lehtimäki (U.S. 6,125,120), and further in view of Miet et al. (U.S. 6,681,202) is respectfully requested.

The Office Action rejected Claim 19 and 29 under 35 U.S.C. 103(a) as being unpatentable over 3GPP (3rd Generation Partnership Project: Technical Specification Group Services & System Aspects; 3GTS 28.062 V1.0.0 (2000-12); pages 1-23) in view of Lehtimäki, Matti (U.S. 6,125,120) as applied to claims 1-2 and 14 in part 3 rejection above, and further in view of Takashima et al. (U.S. 5,983,172).

Takashima et al. describes coding an acoustic signal in the range of 50- 7000 Hz.

The prior art of record, including Takashima et al., fails to disclose the method of puncturing of a narrow band digital signal with data packets carrying a wideband speech signal as detailed in independent claims 1 and 14. Therefore, withdrawal of the rejection of claims 19 and 29 under 35 U.S.C. 103(a) as being unpatentable over TS 28.062 in view of Lehtimäki (U.S. 6,125,120), and further in view of Takashima et al. (U.S. 5,983,172) is respectfully requested.

Allowable Subject Matter

Claims 17 and 27 have been objected to as being dependent upon a rejected base claim, but would be allowable if a rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Taking the Examiner's comments into consideration, claims 17 and 27 have been amended into independent form. Therefore, allowance of claims 17 and 27 is respectfully requested.

New Claims

New claims 31-36 have been added to this application. No new matter has been added to the application. New claims 31-36 find support in paragraph 35 (page 10, lines 3-14) of the specification. New claims 31-36 patentably distinguish over the prior art relied upon by reciting the step of “puncturing the narrowband digital signal by inserting, in a pseudo-random basis, a plurality of data packets containing said wideband speech signal into the least significant bits (LSB) of a mantissa value portion of the PCM symbols”. The prior art of record fails to describe this limitation.

New claims 37-52 particularly correspond to claims 1-7, and particularly set forth the operation of *puncturing the narrowband digital signal by inserting the plurality of data packets carrying the wideband speech signal into the narrowband digital signal*. New claims 37-52 are therefore allowable for the reasons set forth above.

Therefore, allowance of new claims 31-52 is respectfully requested.

CONCLUSION

In view of the remarks presented above, the Applicants respectfully submit that the pending claims are allowable. Accordingly, reconsideration and allowance of this Application earnestly solicited. Should any issues remain unresolved, the Examiner is invited to telephone the undersigned at the number provided below.

Respectfully submitted,

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